MAC MINING AND PARTNERS

RIVER WATER ABSTRACTION

H-MAC539

H-MAC539-RFT-OE-0331-001-SHT-001

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HOLT CONSULTING ENGINEERS

REVISION HISTORY

REV	DESCRIPTION	DATE	ISSUED BY	REVIEWED BY	APPROVED

1 CUSTOMER DETAILS

Customer:	Cardinal Namdini Mining Ltd
Customer Name:	Bright Dzah
Customer Email:	bright.dzah@cardinalresources.com.au

2 PROJECT DATA

2.1 Applicable Codes

SANS 10208: Design of structure for the mining industry Part 3: Conveyances

SANS 10160: Buidling Loading Code

SANS 10162: Steel Design Code

SANS 10100-1: The Structural use of concrete Part 1 – Design

SANS 10100-2: The Structural use of concrete Part 2 – Materials and Execution of Work

SANS 10144: Detailing of steel reinforcement for concrete

SANS 10161: The design of foundations for buildings

SANS 110: Sealing components for the building industry, two components, polysulphide base

SANS 10164: The structural use of masonry Part 1

BS 2853: The design and testing of steel overhead one way beams

AWS D1.1: Structural Welding Code - Steel

SANS 10120-3: Corrosion protection systems for steelwork

EN 10025: Hot rolled products of structural steel

SANS 986: Pre-cast reinforced concrete culverts

SANS 1077: Sealing compound for the building and construction industry, two components, polyurethane base

BS 3148: Test for water for making concrete

BS 5075-1: Concrete admixtures

BS 5075-2: Specification for accelerating admixtures, retarding admixtures and water reducing admixtures

BS 5075-3: Specification for air-entraining admixtures

BS 5075-4: Specification for superplasticizing admixtures

BS 5838: Specification for dry packed cementitious mixes

BS 5838-1: Prepacked concrete mixes

BS 5838-2: Prepacked mortar mixes

2.2 Site Conditions

Country	Ghana	
Region	Talensi District (Upper East Region of Ghana)	
Closest Regional Centre	Bolgatanga	
Distance to Regional Centre	50	*km*
Main Route to Regional Centre	Talensi Trunk Road off the Tamale-Bolgatango Highway	
Elevation Above Sea Level	190	*mAMSL*
Coordinates	10.63 ° N (Latitude)	
	0.66 ° W (Longitude)	
Area Climate	Cool, Dry and Dusty	
Maximum Temperature	39.3	*C*
Average Temperatren	28.9	*C*
Minimum Temperature	19.3	*C*
Maximum Humidity	68.8	*%*
Average Humidity	46.5	*%*
Minimum Humidity	40.3	*%*
Maximum Annual Rainfall	1464	*mm/a*
Average Annual Rainfall	1022	*mm/a*
Minimum Annual Rainfall	May to October	
Maximum Rainfall in 24 hours	160	*mm*

2.3 Sketches and Drawings
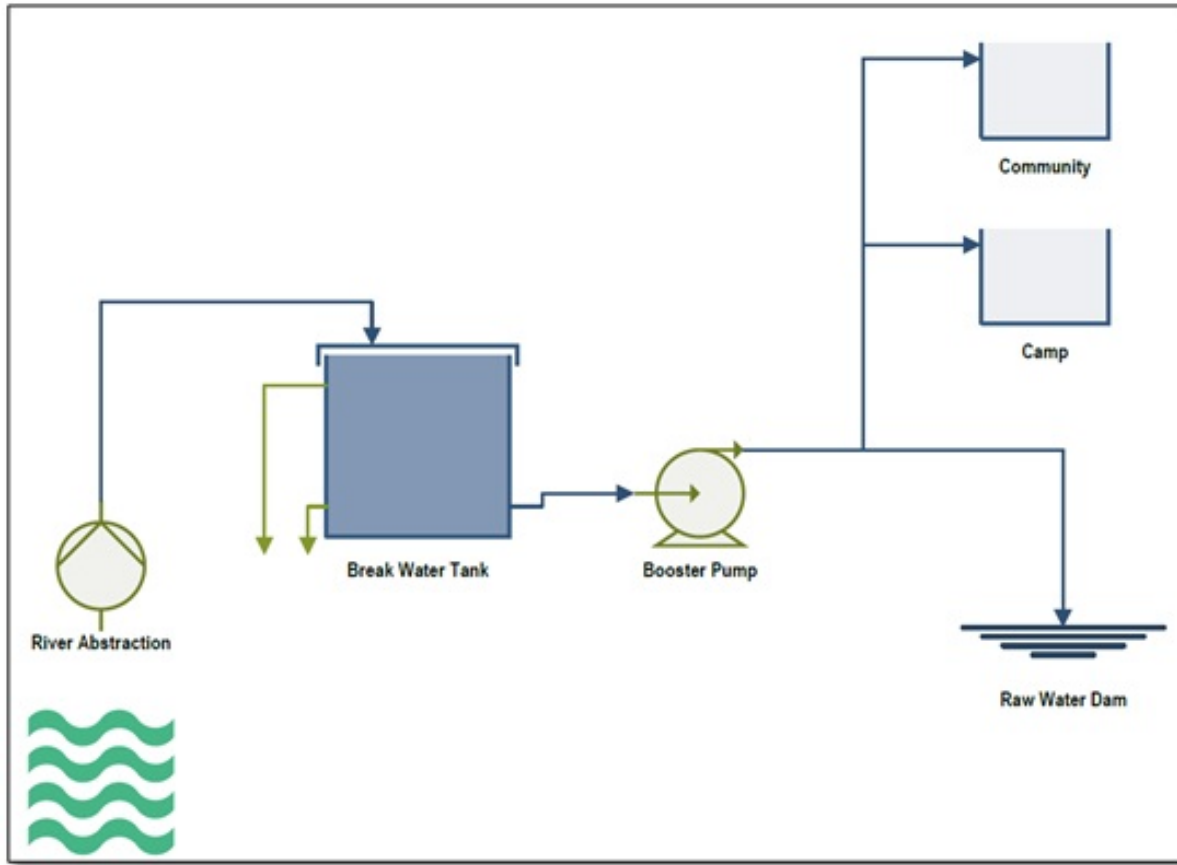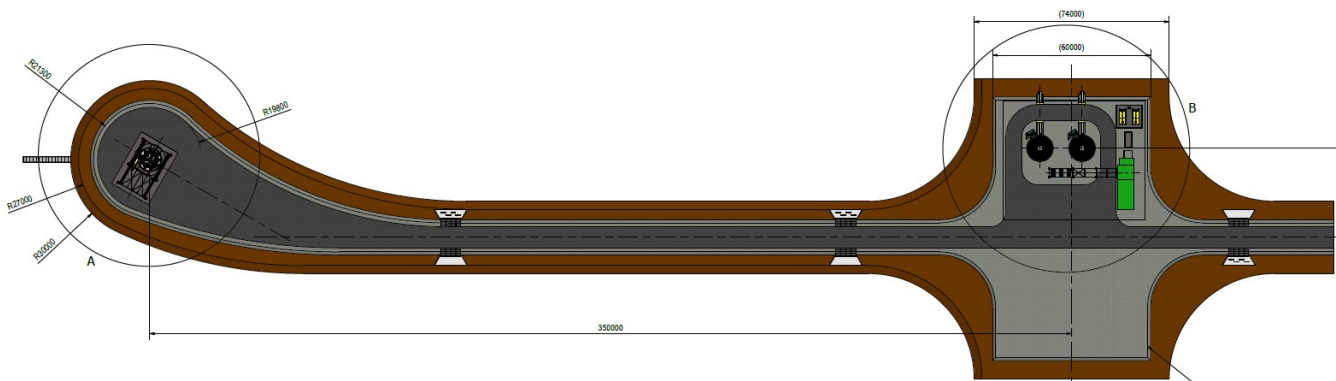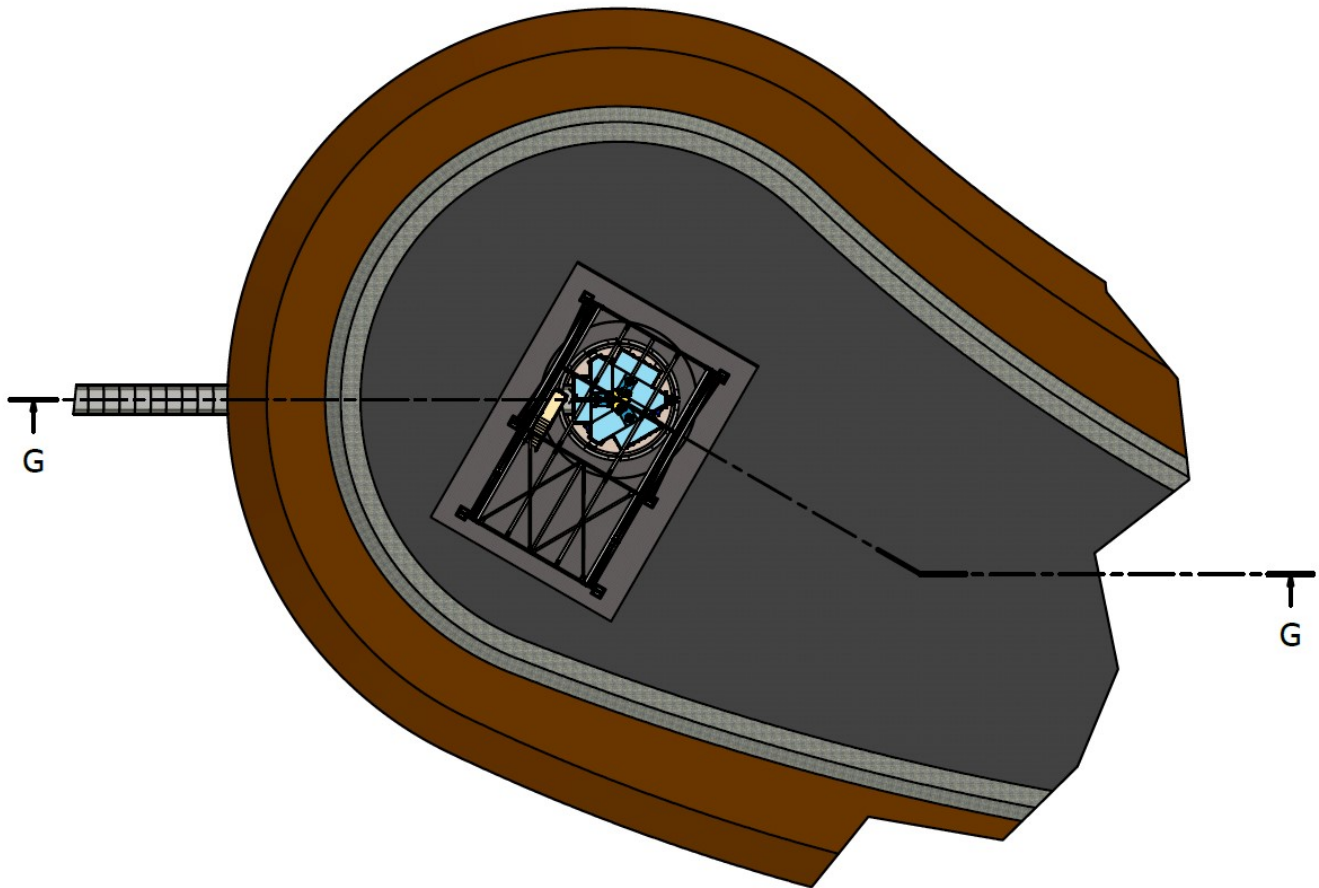
2.3.1 Basic Flow Diagram

Figure 1: Basic Flow Diagram
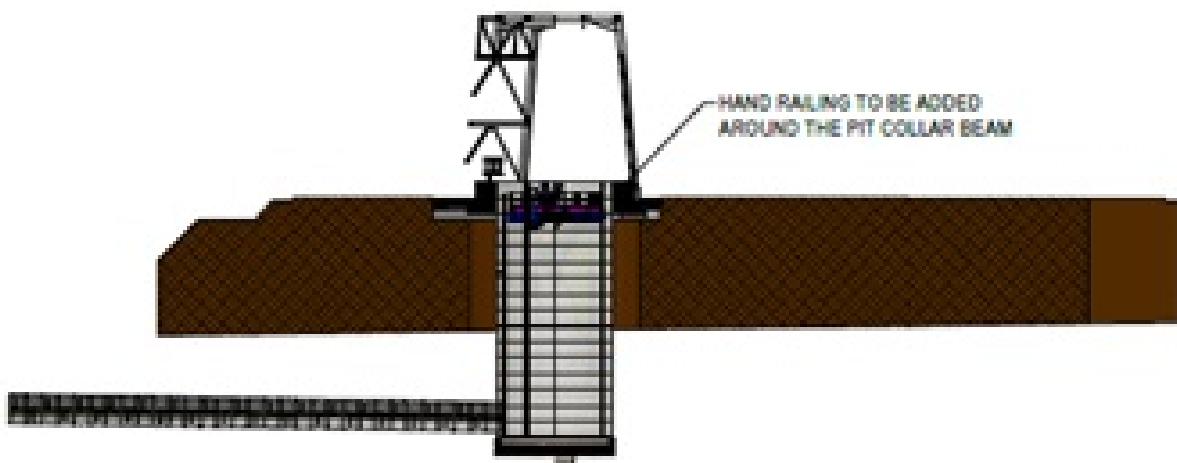
2.3.2 General Layout

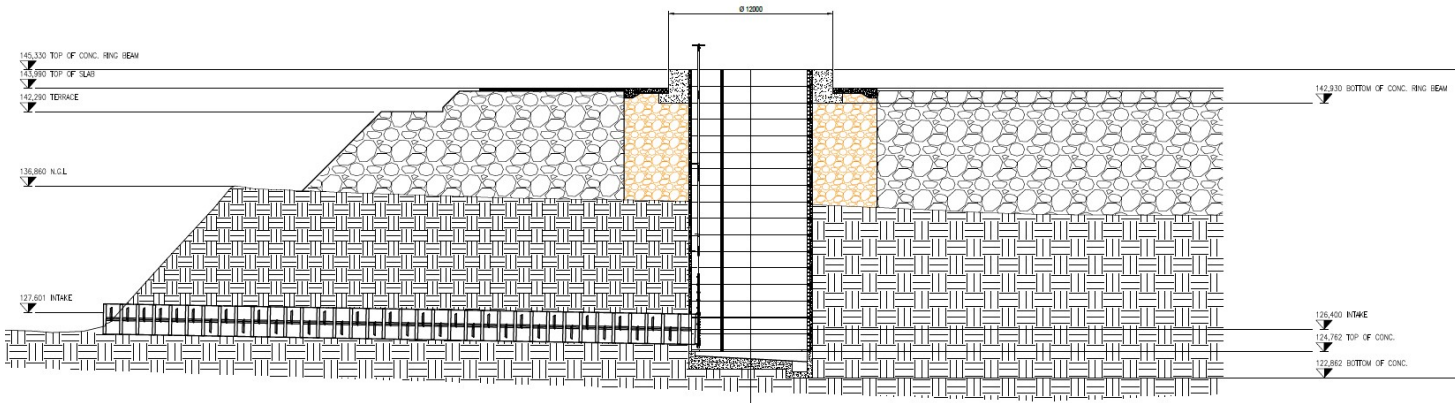
(a) Overall River Abstraction Layout

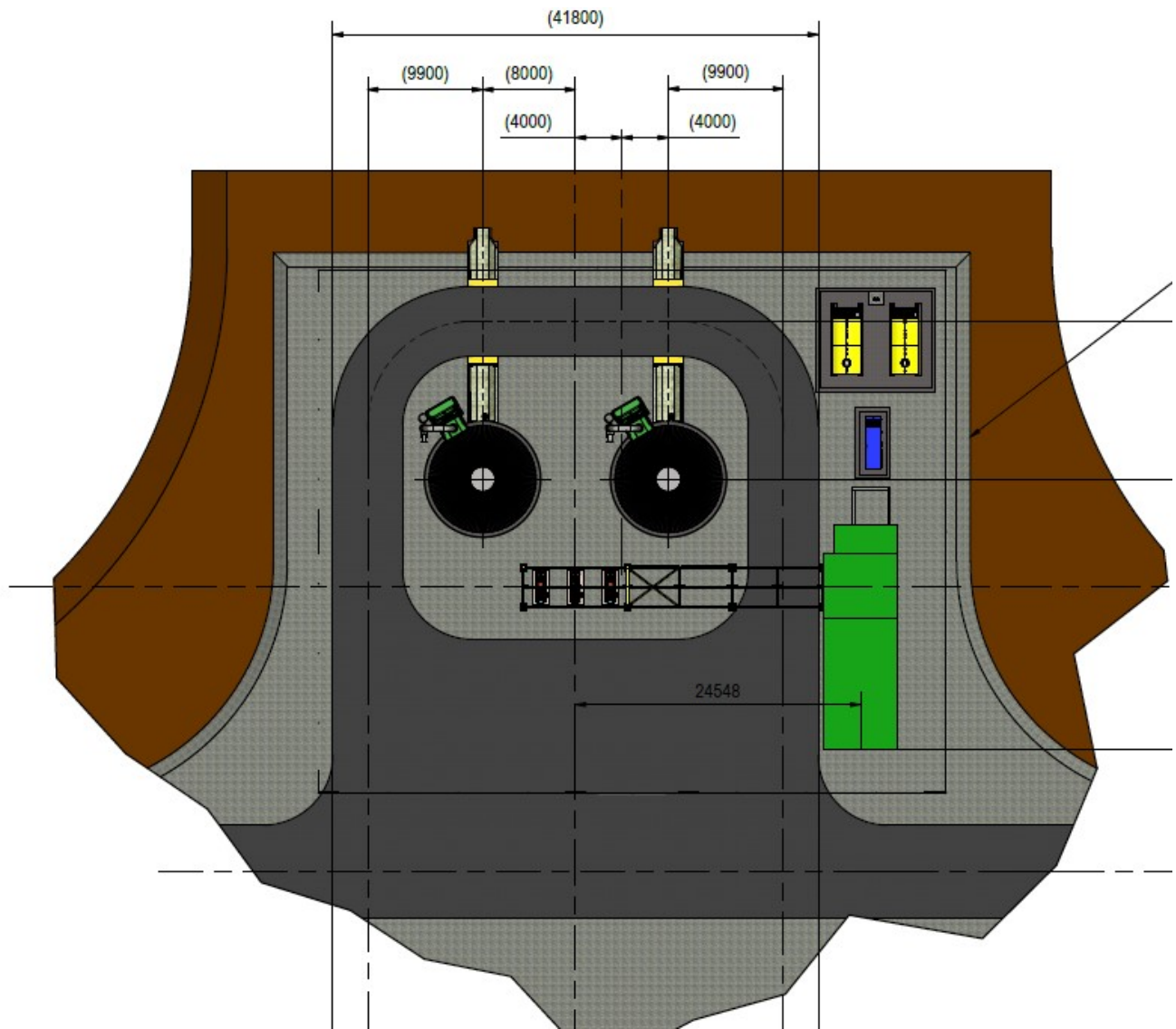### 2.3.3 River Abstraction Detail

(a) River Abstraction Detail 1

(a) River Abstraction Detail 2

(a) River Abstraction Detail 3

(a) Booster Station

3 PROJECT INFORMATION

3.1 Introduction

Namdini is approximately 50 km southeast of the regional town of Bolgatanga in Northern Ghana and around 60 km south of the Burkina Faso border (Figure 19). Namdini lies within the Nangodi Greenstone Belt, one of a series of southwest–northeast trending granite-greenstone belts which host significant gold mineralization in Ghana and Burkina Faso. The Talensi district which was part of the Talensi-Nabdam district became a separate district in 2012, through Legislative Instrument LI 2110, with Tongo as the capital. The district, which is one of the thirteen Municipalities and Districts in the Upper East Region, is bordered to the north by the Bolgatanga Municipality, to the south by West and East Mamprusi Districts (both in the Northern Region), to the west by Kassena-Nankana District, and to the east by the Bawku West and Nabdam Districts. The district lies between latitude 10° 15' and 10° 60' North of the equator and longitude 0° 31' and 1° 05' West of the Greenwich Meridian and covers a land area of 838.4 km2 with a total population of 81,194, which constitutes 7.8The topographic relief within the project area is generally flat with gently undulating terrain, rising to the south where the area is overlain by sediments. Elevation varies from 175 to 250 meters above mean sea level ("AMSL") with average elevation at approximately 190 m. Physiography is primarily savannah grassland characterized by short, scattered drought-resistant trees, scrub, and grass that is seasonally burned by bushfires or scorched by the sun during the long dry season.

As part of the water requirements for the process plant, river water abstraction is one of the methods that will be used to supply water to the plant as well as for the camp and accommodation area. The point of abstraction has been identified which is 10,910 meters from the plant. Water will be abstracted by means of vertical spindle pumps, which will discharge into breakwater tanks of the booster station, 350 meters from the river in a northern direction. The booster station will accommodate the diesel generator, MCC, diesel storage, and the booster pumps which will transfer the water to the raw water storage. Except for areas above ground and the abstraction point, all the piping will be HDPE piping buried next to the main road to the process plant. Piping passing underneath the main road will also be constructed from steel. The line will be equipped with valve boxes and vacuum breakers as well as the necessary scour points. Also, along the line, a T-off will be installed for the supply line to the camp.

3.2 River Abstraction

The point of abstraction is provided by the client. The coordinates of the abstraction point are X=748698.3955, Y=1178401.56, Z= 144.569 (cartesian system). This position was selected as it is the highest point along the river. This is important to accommodate the river level fluctuations and to ensure that the abstraction system is able to perform under these different conditions.

The following are the attributes of the river abstraction configuration:

- The catchpit centre is 45 meters from the riverbank. This distance has been increased from 20 meters to 45 meters to allow space for the causeway, access turning radius and soil stability.

- The level of the slab around the catch pit is at 143,990 mASL. The top of the catch pit ring beam is 145,330 mASL.

- Once the abstraction pump chamber earth, civil, and mechanical works are completed, the embankment left in situ to river to be removed during low level conditions of river. The section of soil embankment to be removed after construction of pump chamber must be stabilized by gabions.

- The centre of the inlet of the water intake pipe is at level 127,600 mASL. Note that the intake slope has been changed to the opposite of that of the original conceptual design. The intake water pipe slopes at 1° downward to the bottom of the catch pit bottom. The centre of the pipe enters the pit at level 126,400 mASL.

- As the area between transfer pump station and river embankment will flood due to its low elevation, a causeway (complete with culverts to allow water flow) has been incorporated for access to abstraction pumps.

- The power supply to abstraction pumps to run on the causeway.. . .

3.3   Booster Station

The point of abstraction is provided by the client. The coordinates of the abstraction point are X=748698.3955, Y=1178401.56, Z= 144.569 (cartesian system).

The following are the attributes of the booster station configuration:

- The station consists of two areas. On the western side of the causeway is the booster station and on the earstern side the contractor's laydown area.

- The booster pump station will house the buffer tanks, booster pumps and substation.

- The area will also be equipped with a building consisting of a security office, control room, store room, workshop and the substation. . .